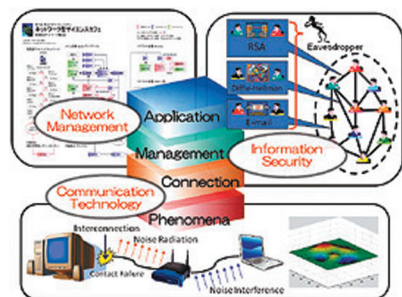


## Research and Development Divisions

### Information Network Systems Director: Prof. Hideaki Sone

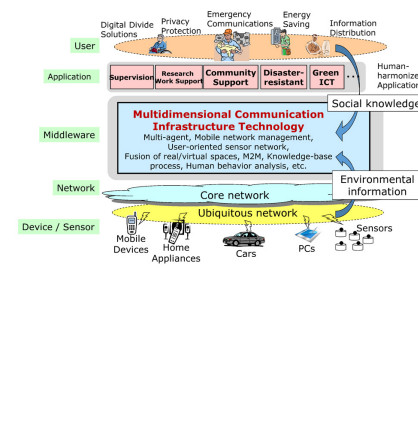
Research and development activities in the division are related to service of campus networking infrastructure and improvement of advanced information network environment.

Major research fields are electromagnetic compatibility (EMC), electromagnetic information leakage, information security, and network management.



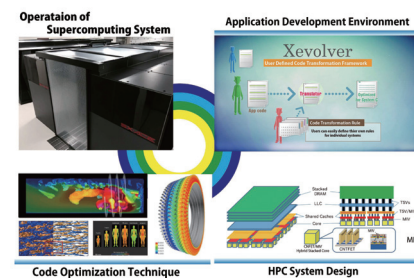
### Communication Infrastructures Director: Prof. Takuo Suganuma

This division is promoting the researches of provisioning the unified communication infrastructures for the University-wide systems, and the advanced utilization of them. Also, we are working on the R&D to establish the new communication environment where each entity in human community, society and natural environment performs high level mutual collaboration.



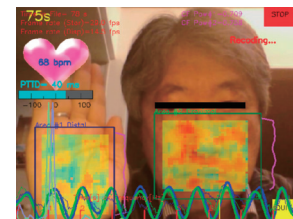
### Supercomputing Systems Director: Prof. Hiroyuki Takizawa

Through the operation of supercomputing systems, we focus our research on the design and development of next-generation supercomputing systems and their applications. Targeted areas range from key components of supercomputing systems, which include energy-aware system architectures and highly-productive programming environments, to performance optimization techniques for accelerating innovative supercomputing applications.



### Advanced Information Technology Director: Prof. Makoto Yoshizawa

Our laboratory has proposed cyber-health monitoring whose purpose is to accelerate innovations of intelligent health monitoring systems by applying synergetic effects of advanced information and communication technology. We aim at developing clinical application of virtual reality systems, assessment of digital contents using biological information, systems for estimating and controlling artificial circulatory dynamics, non-contact biological signal measurement, artificial intelligence for computer-aided diagnosis in medical image, intelligent measurement and control techniques for next-gen radiotherapy system, and high accuracy signal matching algorithms.



Non-contact biological signal measurement from video images

### Joint-Research Division of High-Performance Computing (NEC) Director: Prof. Hiroaki Kobayashi

This division was established in 2014 as a core center of Tohoku University-NEC cooperation on high-performance computing. As the knowledge and experiences in practical use are imperative for future-generation system design, the research topics include migration and optimizations of laboratory-developed science and engineering applications to the level of high performance on the supercomputing systems of Tohoku University. In addition, the faculty members of the division work with researchers and engineers outside Tohoku University, especially from the industry, invited as Visiting Professors, Visiting Associate Professors, and Visiting Researchers, and promote joint-research projects regarding next-generation supercomputing systems development.

### Cloud Service Infrastructure (CSI) Laboratory

The CSI laboratory aims at developing secure cloud and network infrastructures including the World-wide Campus Wireless Network based on the Identity Federation Platform of the Japan's Cyberscience Infrastructure.

Together with GakuNin the Academic Access Management Federation by the National Institute of Informatics in Japan, the laboratory is in charge of the R&D on convenient, secure, disruption/disaster-tolerant network roaming systems and related cloud services covering eduroam the world-wide research and education Wi-Fi roaming system.



# Cyberscience Center, Tohoku University



Cyberscience Center was founded as a national supercomputer center hosted by Tohoku University in 1969. Since then, the Center has been installing high-end computing systems and providing them to researchers and students nation-wide. In addition to the role of a national inter-university joint usage / research center for high-performance computing, the Center is responsible for cyber-infrastructure of the University.

The mid-term plan 2016-2021 of the Center includes:

- Contribution to academic research, industry, local community, and culture by way of promotion and deployment of the world's most advanced information infrastructure, research for advancing application and next-generation information infrastructure, construction of creative research environment, and development of human resources for new leaders in the field.
- As a joint usage / research center, provision of large-scale HPC resources to nation-wide universities and other institutes, and promote the pursuit of research progress for future information infrastructure.

The faculty members also get involved in education of undergraduate and graduate students and research of the information and communication technologies as members of collaborative laboratories of School of Engineering, Graduate School of Information Sciences, and Biomedical Engineering of Tohoku University.

We would like to sincerely appreciate your continuous support and cooperation.

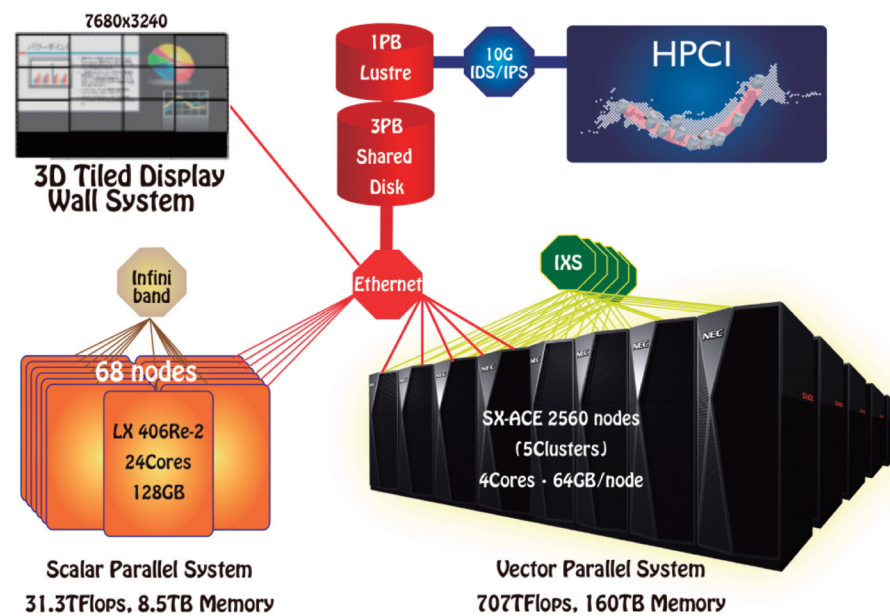


Hideaki Sone  
Director of  
Cyberscience Center

## Supercomputer Systems

A supercomputing system of our center is part of the high-performance computing infrastructure for academic sciences and engineering communities in Japan. We strongly support cutting-edge researches with advanced high-performance computing environments. The super-computing system consists of a vector system, a scalar system, and a visualization system. In February 2015, to accelerate memory-intensive applications, the vector parallel system SX-ACE is introduced. The SX-ACE system consists of 2,560 nodes, and each of them consists of four cores with a 64GB memory. The total

peak performance and memory bandwidth of the system reach 707 Tflop/s and 655 TB/sec, respectively. The total memory capacity is 160 TB. The scalar-parallel system, LX 406Re-2, consists of 68 nodes, each of which is equipped with two 12-core sockets. The peak performance of the system reaches 31.3 Tflop/s with 1632 cores. The total memory capacity is 8.5 TB. This system also works as a front-end server of the SX-ACE system. Furthermore, to effectively analyze the simulation results, the visualization system with 3-D Tiled Wall Display is directly connected to supercomputer systems.



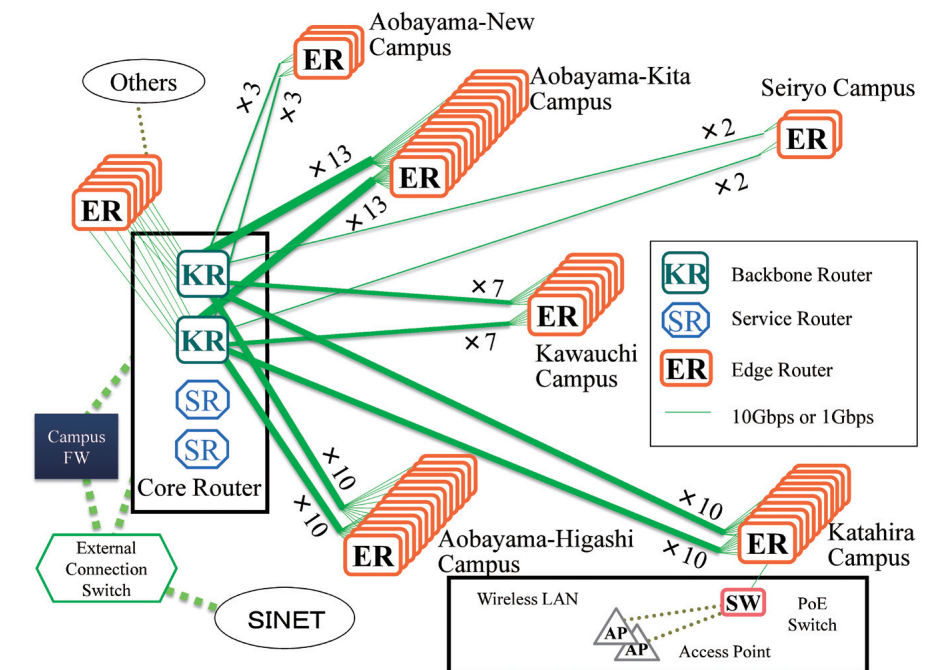
Scalar-parallel Supercomputer LX406Re-2



Vector-parallel Supercomputer SX-ACE

## Information Network Systems

Tohoku University's TAINS (Tohoku University Academic/All-round / Advanced Information Network System) has been in service since 1988 and was the first large-scale campus-wide network in Japan. Its successor since 2009 is StarTAINS which links the center to all major buildings in the widely-spread six campuses.



## Promotion of Information infrastructure in Tohoku University

The Cyberscience Center, which is playing a core roll in the Information Synergy Organization, contributes to development and operation of the campus-wide information infrastructure such as information network system, various network service, common information system and information security system, and coordinates any plans on designing and deploying the university-wide information infrastructure. We also contribute to running the Tohoku Open Internet Community, TOPIC.

## Activities on Joint Usage / Research Center

### Japan High Performance Computing and Networking plus Large-scale Data Analyzing and Information Systems (JHPCN) / High Performance Computing Infrastructure (HPCI)

In 2010, JHPCN (Japan High Performance Computing and Networking plus Large-scale data Analyzing and Information Systems) has been organized by eight centers equipped with supercomputers. As a constituent center of JHPCN, we promote interdisciplinary joint researches toward grand challenge problems by using information infrastructures of JHPCN.

We get involved in deployment and operation of the High Performance Computing Infrastructure (HPCI) as a resource provider, which consists of K computer and other major supercomputers in Japan. HPCI make these super-computer resources available with the single sign-on.



## Publicity

### Publicity and User Support

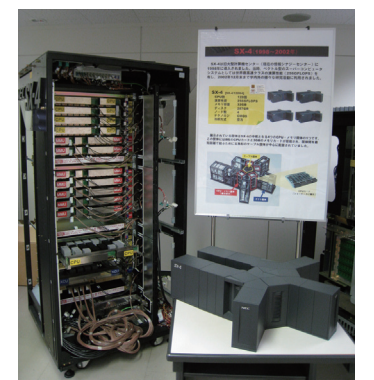
We publish a periodical named SENAC with news and articles related to high performance computing and networking.

We provide consulting services, training classes, and workshops to use our resources effectively and efficiently.



### Exhibition Room

The exhibition room of Cyberscience Center was set up to inform the public widely about the history of computer technology development. This room exhibits the parts, units and cabinets of historical computers including the units of a parametron computer jointly developed by Tohoku University and NEC in 1958. In 2010, this room has been authorized as a part of the Satellite Museum of the Historical Computers by Information Processing Society of Japan (IPJSJ).



SX-4 (1998-2002)